OFFER N°: QU_1801_20831

January 17, 2018

SEAPIX 3D Sonar

MPC LTD

Vietnam Government Fleet

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1. Introduction

1.1. Product description

SeapiX is a whole new category of equipment. For the first time in the fisheries market, in a unique product, a high-performance acoustic tool can merge acoustic data with the commercial fishing geographical information system, superimposing whole new layers of fishing information in 2D or 3D: fishing plans, acquired bathymetric data, type of seabed, fish detection and shoal morphology/dynamics, fishing gear, logbook catch results, oceanographic data, AIS/Radar navigation safety, and more.

This new 3-Dimensional Sonar delivers real-time knowledge of the habitat and the fisheries resource with unequalled calibrated accuracy. SeapiX is a complete, standalone decision aid system combining its acoustic sensor for analysis of the marine environment with its own data processing system.

SeapiX generates one or more scan swathes along or across the vessel axis, thus providing total three-dimensional coverage of the water column, a bathymetric profile of the seabed and identification of sediment type.

All this makes SeapiX a genuine “third way”, offering both the key advantages of omnidirectional sonar and those of sounders, while at the same time providing completely new functionalities to fishermen in order to practice selective and profitable methods.

The system consists of acoustic antenna housing, an interconnexion box, a Beam former Processor, a Viewer Processor and displays.

The Acoustic Antenna contains the whole electronics devices and consists of a dual multibeam array operating on a single 150 kHz frequency.

The Beamformer Processor employs Linux operating system to perform beam & signal processing tasks. The Viewer Processor employs Microsoft Windows Seven operating systems to perform operator interface and data storage tasks.

Communication between the Acoustic Antenna and Beamformer Processor is through a LAN network cable, as well as between the Beam Former Processor and the Viewer Processor.

SEAPIX Acoustic Antenna unit operates on 24 DC voltage, the Processors operate on 220 Vac.

1.2. Principle & Technology

To overcome a challenge of this kind, the technical choices of IXBlue’s engineering design staff homed in on innovative technological solutions. As a military technology covered by a number of patents, SeapiX is the first compact civilian system comprising a dual Mills Cross multibeam sonar transducer offering total liberty of control.

SeapiX generates one or more scan swathes along or across the vessel axis, thus providing total three-dimensional coverage of the water column, a bathymetric profile of the seabed and identification of sediment type.

Its transducer generates several simultaneous multibeam transmissions and acoustic processes to yield quantitative and qualitative measurements of the marine environment. Its multiple advanced modulation modes, including CHIRP, combined with pulse compression, are guarantees of the highest possible detection performance, even in difficult conditions.

Every acoustic data processed by SeapiX is instantaneously plotted and stored into the skipper's database for real-time or future analysis. SeapiX is a powerful multilayer fishing data analyzer that offers advanced user object filtering methods. Interfaced to sensors available on board (net control, radar, Oceano data service, logbook, etc…), SeapiX superimposes relevant information to enhance skipper efficiency.

In order to optimize performances and installation on board, IXBlue has eliminated all wired connections between the acoustic transducers and the signal processing modules. Electronic processing chain and dual 64 elements array are integrated into the compact transducer body, providing exclusive versatility in beam forming. The high-accuracy motion sensor unit is embedded. Its accuracy reach an unparalleled level on the fishing market, thanks to narrowest beams (1,6° x 1,6°) and advanced acoustic modulation principles (resolution +/-4 cm).

1.3. Key Features

- Mills Cross dual multibeam swaths in a single compact antenna housing,
- Built in motion sensor compensating whole swaths (transmitting and receiving)
- Advanced CHIRP frequency modulation for both Sonar swaths and Echograms,
- Merge of acoustic data into GECDIS based fishing plotter system,
- 3D sonar covering a pyramidal 120° water volume,
- High resolution Bathy MBS for Fishery, with embedded motion sensor,
- FMH modulation fishing echogram,
- Dual MBS with swath tilt capability,
- Sonar data merged with the navigation & fishermen database,
- Geographical Biomass Analyzer "GBA" processing and utility,

2. Functionalities

2.1. Swaths and beam patterns

By combining all swath coverage, the skipper can control a “pyramidal” volume like. Thus providing total three-dimensional coverage of the water column (biomass), a bathymetric profile of the seabed and measurement of sediment hardness.

As an exclusive “Dual multibeam system”, SeapiX generates one across track the vessel multibeam swath, called “STV”. Simultaneously, SeapiX generates one along track the vessel multibeam swath, called “SAT”.

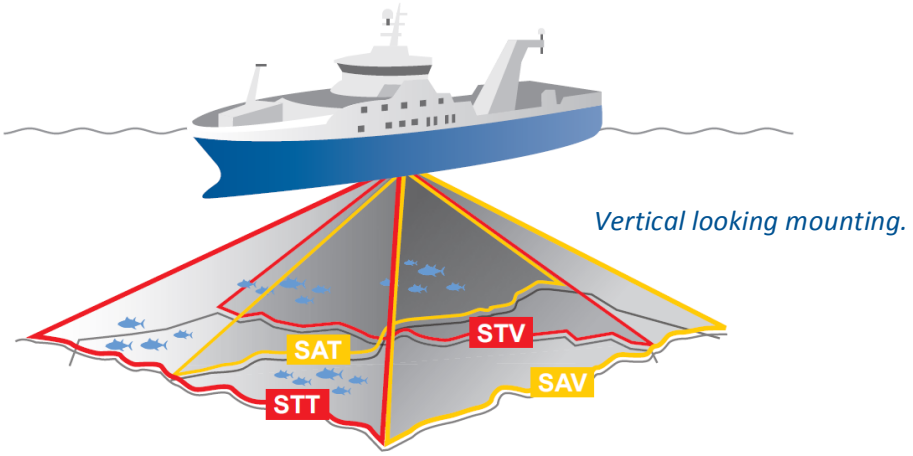
In addition, SeapiX can generate two additional “steerable” multibeam swaths:

- One tiltable multibeam swath across track the vessel, called “STT”,

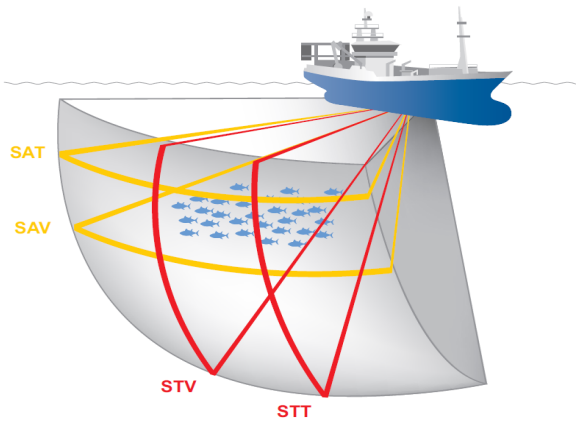
-One tiltable multibeam along track the vessel, called “SAV”. SAV is automatically steered to ensure entire water column seeking.

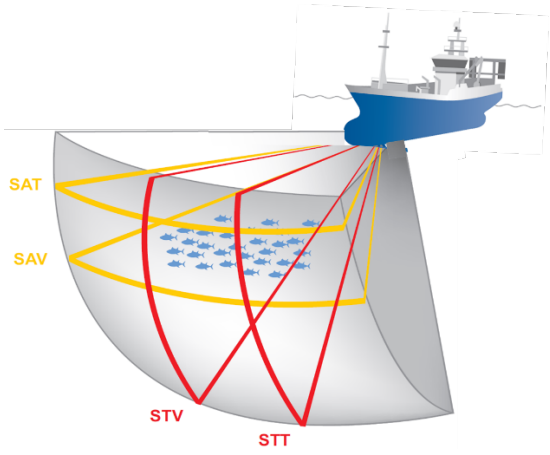
Depending on the fishing application, Seapix can be mounted in vertical mode (classic) for trawlers or in side looking mode (Pair trawlers, purse seiner).

Depending on the fishing application, Seapix can be mounted in vertical mode (classic) for trawlers or in side looking mode or Looking forward mode (Pair trawlers, purse seiners, Tuna seiners).



Vertical looking mounting.





Side looking mounting. *Forward looking mounting.*

All swaths have 120° opening angle by 1.6° thickness. Steering (Tilt) capabilities is +/- 50° range.

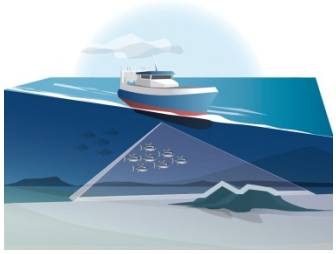
2.2. Modes of operation

SEAPIX provide the operator with unparalleled functionality richness for commercial fishery vessels purposes. By managing simultaneously 4 individual "Sonar" beams, it offers several real-time "Modes" of operations:

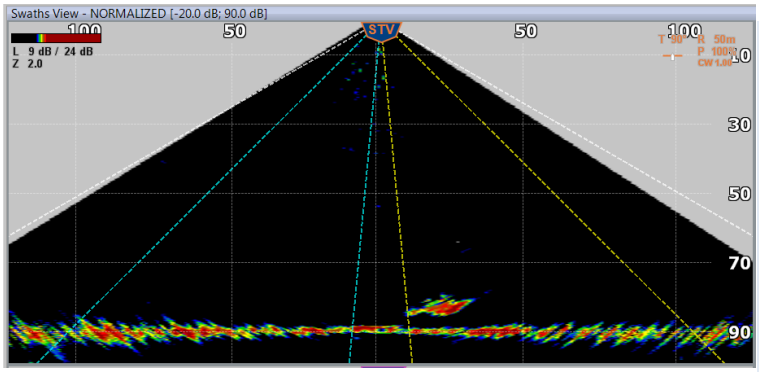
- **STV**: Sonar Transversal Vertical
- **STT**: Sonar Transversal Tiltable
- **SAT**: Sonar Axial Tiltable
- **SAV**: Sonar Axial Volume
- **SLI**: Sonar Lateral Imaging
- **SONAR**: Omnidirectional sonar picture
- **ECHO**: Sounder Echogram
- **2D**: 2D mapping & bathymetry view with navigation & information layers
- **3D**: 3D mapping & bathymetry view with navigation & information layers

The screen layout principle allows running SeapiX manager software on a single screen. Due to its functionality richness, it is strongly recommended to wire a minimum of two 19' displays, or to take advantage of the standard dual video outputs facilities.

STV: Sonar Transversal Vertical



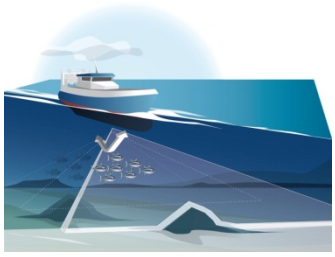
STV is an essential sonar beam in use, forming a "classic" Transversal multibeam swath from port to starboard in charge to produce the high accuracy bathymetry database. All biomass and water column targets are also displayed. The operator gets sonar like acoustic view covering 120°.



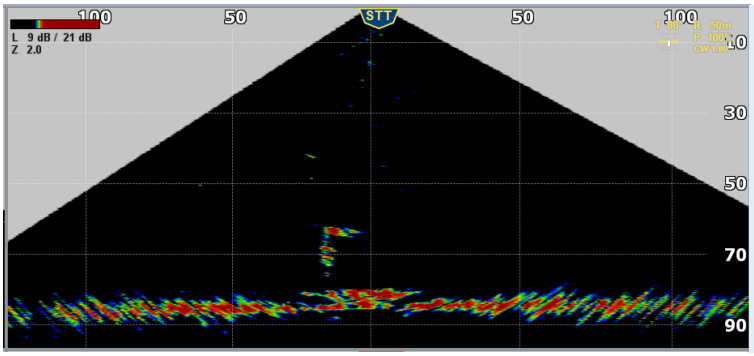
The vessel is located at the top center of the picture, controlling the port-starboard bottom profile while controlling biomass echoes. The STV Tilt angle is 90° fixed (vertical).

- **Range**
- **Display gain and zoom**
- **FMH or CW Modulation**
- **Pulse length**

STT: Sonar Transversal Tiltable



STT is a secondary Transversal Sonar swath, similar to the STV, but can be tilted forward and stern according to the operator needs for fish searching. The operator gets tiltable sonar like acoustic view covering till 120° from port to starboard. Biomass and water column targets are displayed.

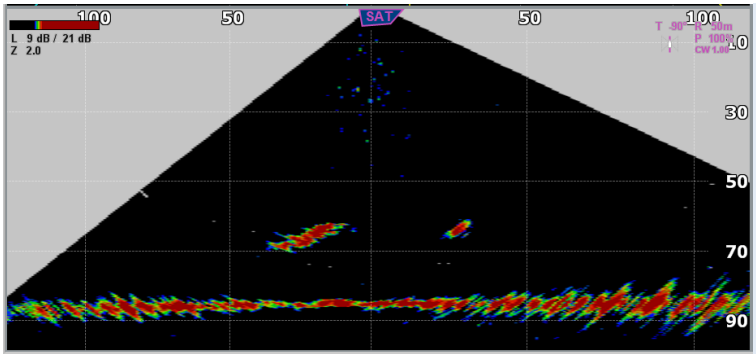


The vessel is located at the top center of the picture, controlling the port-starboard environment thanks a 120° tiltable multibeam coverage. The STT Tilt angle is manually adjustable.

- **Range, manual & Auto**
- **Display gain and zoom**
- **Tilt angle from +50° to -50°**
- **FMH or CW Modulation**
- **Pulse length**

SAT Sonar Axial Tiltable

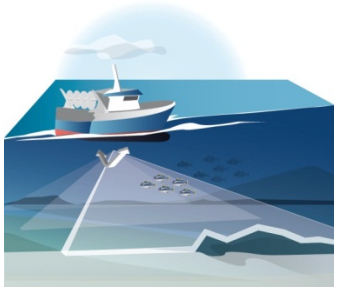
SAT is an exclusive alongside vessel multibeam swath. It covers water column as well as bottom profile forward to stern, allowing fishing incident risks warnings and noticing skipper to anticipate trawl adjustments. SAT becomes the relevant tool to optimize capture stage by target keeping in the stern vessel axis nearby trawl gate.



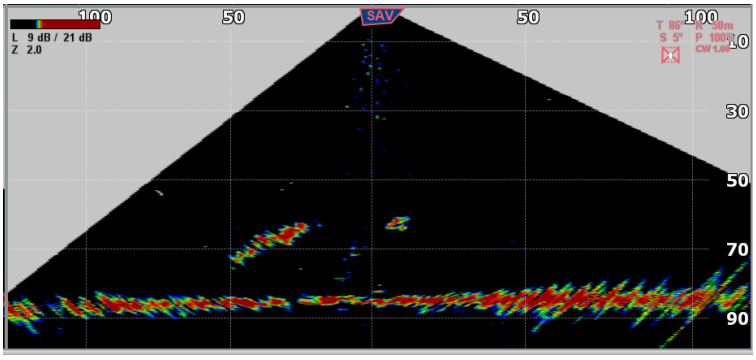
The vessel is located at the top center of the picture, controlling forward (left side of the picture) to stern bottom profile while controlling biomass echoes. The SAT Tilt angle is manually adjustable **Range, manual & Auto**

- **Display gain and zoom**
- **Tilt angle from +50° to -50°**
- **FMH or CW Modulation**
- **Pulse length**

SAV: Sonar Axial Volume



SAV is a secondary alongside vessel multibeam swath, similar to SAT, but scanning automatically from starboard to port in order to provide the skipper with biomass targets. It produces unparalleled water volume surveillance, containing omnidirectional water column detection. Thanks to its high resolution beams, it provides 360° sonar like information with full real time stabilization. The skipper can operate on fish shoals even in shallow waters and rough conditions, having 2D & 3D presentation without bottom jamming.

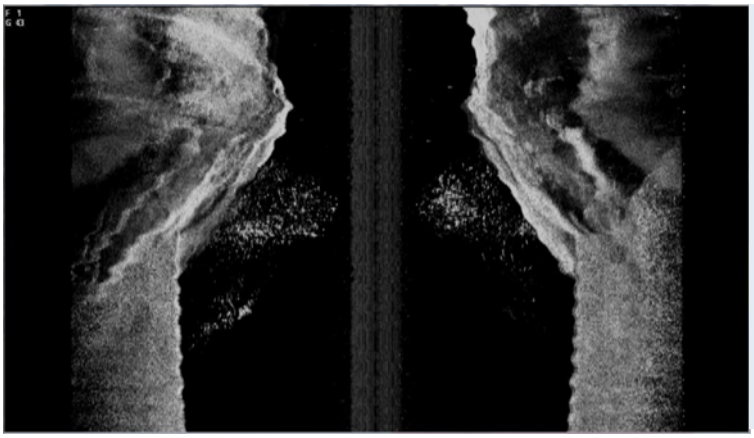


The vessel is located at the top center of the picture, controlling forward to stern bottom profile while controlling biomass echoes. SAV Tilt angle is automatically scanned.

- **Range, manual & Auto**
- **Display gain and zoom**
- **Auto Tilt scanning from +50° to -50°**
- **Adjustable Scanning angle range**
- **Adjustable Scanning steps, from 1° to 10°**
- **FMH or CW Modulation & Pulse length**

SLI: Sonar Lateral Imaging

SLI provides a well-known “Side Scan” sonar solution, by using half port and half starboard STV multibeam swath. The SLI screen shows an acoustic shadowing effect picture, providing the skipper with clear feeling about the bottom roughness. SLI is recommended for small object recovery. Thanks to Seapix merge of acoustic data and GIS capabilities, the skipper can pinpoint special points of interest and create marks (recorded in his fishing trip database) with an unparalleled accuracy.

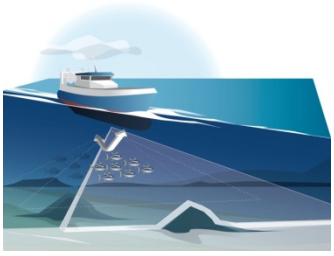


The vessel is located at the top center of the picture, lightening the bottom shape to port and starboard.

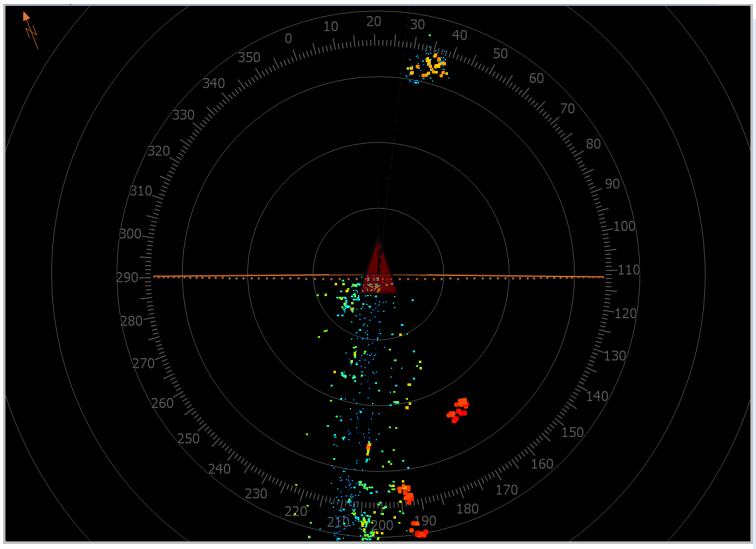
Dedicated settings adjustments:

- **Display Gain**
- **Shadowing contrast**
- **FMH or CW Modulation**

SONAR: Omnidirectional sonar view



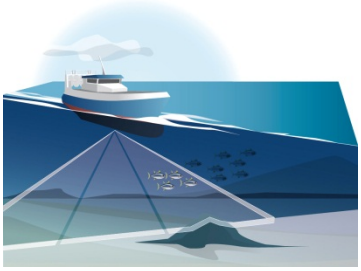
Thanks to its several multibeam running at the same time (STV/STT/SAT/SAV), SEAPIX seeks a wide water volume and extracts biomass information only, to show a tactical 360° shoal situation. It makes 100% bottom echoes filtering, providing clear biomass information, and ensures the most suitable assistance to the skipper during the manoeuvring stage.



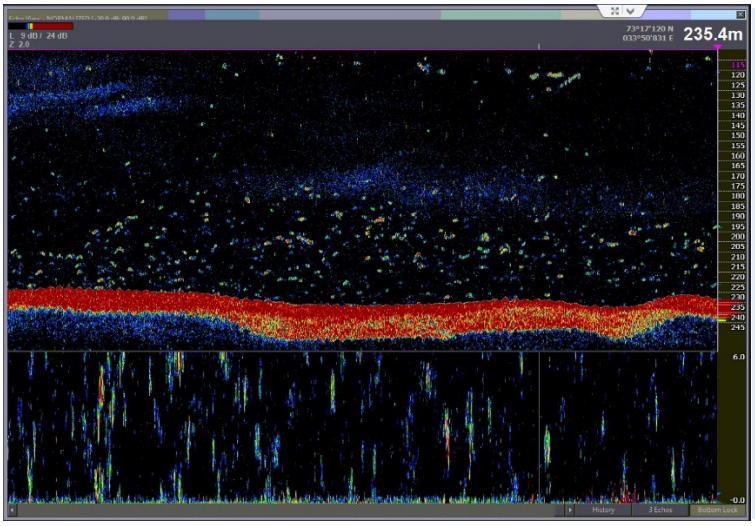
The vessel is located at the center of the picture. Multi Swath coverage brings biomass data as a Heading Up sonar view. SAS ensures a wider coverage, scanning port to starboard. Vessel track and net gear can be displayed, offering an optimized catching view.

- **Manual range,**
- **Mark and user object viewer linked to 2D and 3D.**
- **Echo positions linked with the Echogram.**
- **Trawl tracking.**

ECHO: Fishing Echograms



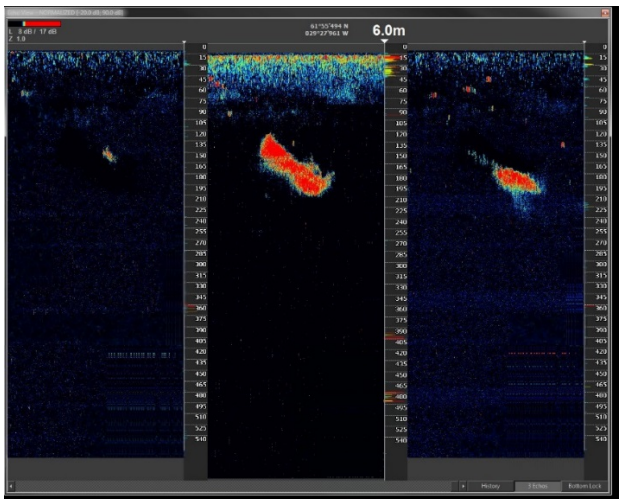
ECHO display mode produces fishing Echograms. It represents the content of one of 120° swath as a conventional history Echogram. Thanks to SeapiX motion stabilization, advanced FHM modulation principle and narrow individual beams, the ECHO provides an extremely sharped bottom and biomass definition.

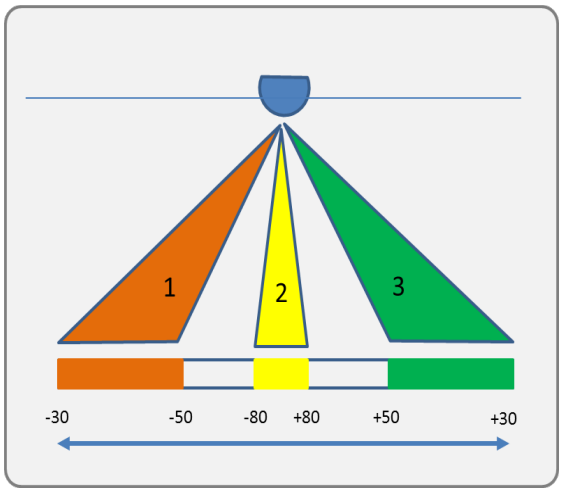


The vessel is located at the top right side of the picture. The whole 120° sounder coverage is concentrated in a global surface to bottom Echogram view,.

- **Single or Triple echogram**
- **Echogram opening adjustable from 1° to 120°,**
- **Echogram tilt adjustable from -40° to +40°,**
- **Modulation FMH or CW**
- **Manual/auto range, manual shift & expansion**
- **Display Gain**
- **Real time /Pause/History views**
- **Buffer history and history viewer**
- **Mark editor linked to 2D and 3D.**

SeapiX provides one, two or three independent echograms, with free adjustments about opening sectors and Tilt from port to starboard. Skipper gets this exclusive benefit to cover 20 times more water volume seeking in real-time.

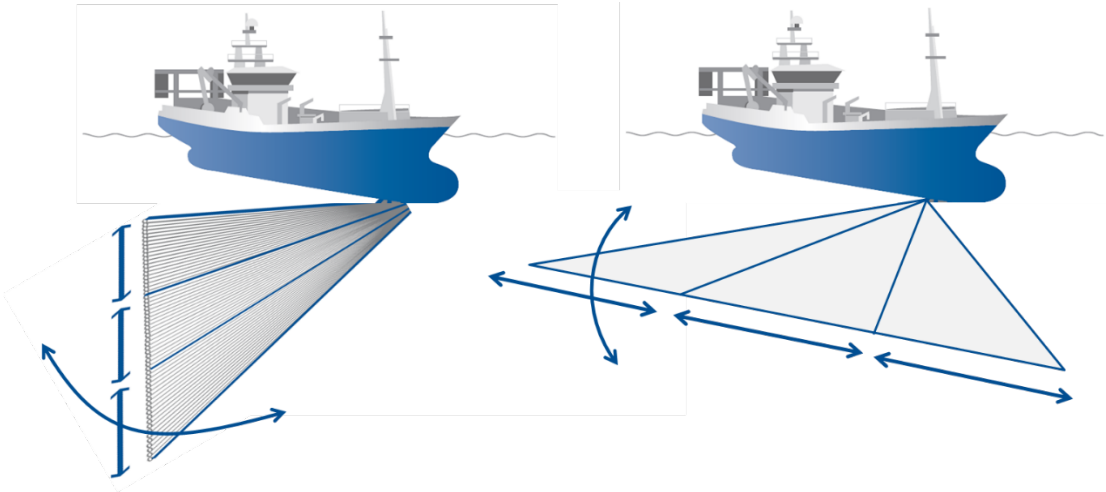




SeapiX sensor provides an exclusive resolution for commercial fishing purposes. Thanks to its Hyperbolic Frequency modulation (CHIRP), radial resolution reach 7,5 cm only, whatever the target to antenna distance.
Built with two 64 elements arrays, the angular resolution is extremely narrow, only 1,6° x 1,6°.
Radial and angular resolutions are key features for fish discrimination and bathymetry operations.

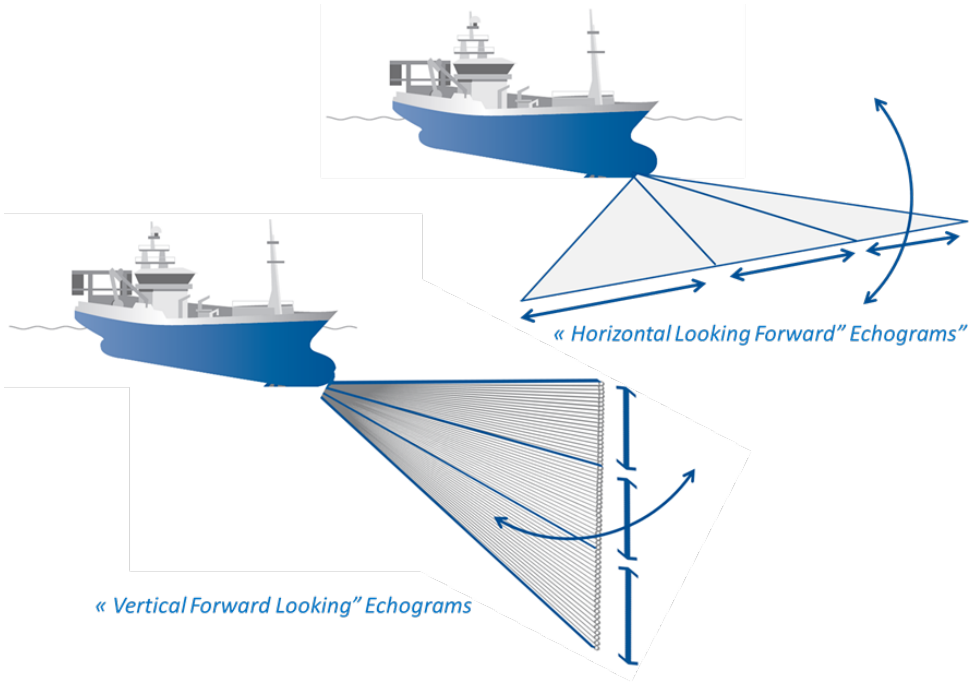
SeapiX provide a unique advanced Echograms with Pitch/Roll/Heave compensation in real time. Readout of fish detection are dramatically more realistic.

Whatever the type of mounting, Echograms can be formed in all swaths. Also when SeapiX is operating as a “Side looking mounted” or as a “Forward looking mounted” system, many combinations of echogram arrangements allows skipper to keep perfect control of the fish.



« Vertical Side Looking” Echograms

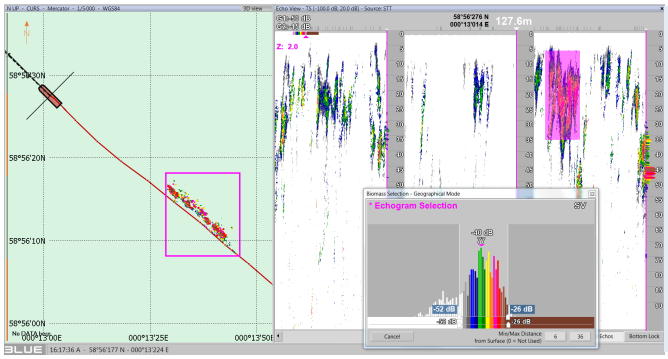
« Horizontal Side Looking” Echograms



Geographical Biomass Analyzer *GBA*

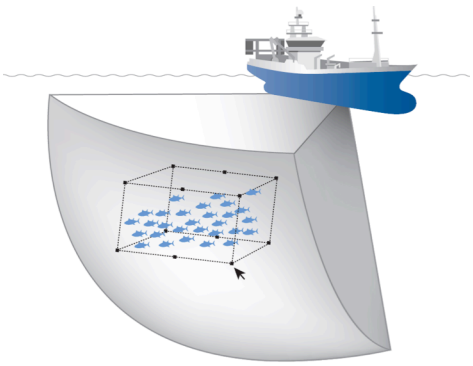
SeapiX extracts water column fish shoal layer, and displays it in 2D & 3D GIS views. Fish Distribution tool computes fish assessment & distribution related to the displayed shoal. SeapiX can sum the whole Habitat biomass, or analyse each targeted shoal from the 2D view. It provides the skipper better understanding about fish species crossover, to perform selectivity and resource management.

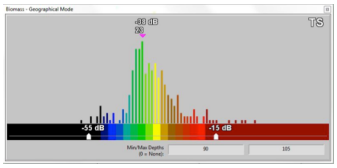
The skipper can clearly understand identify TS distribution features for the species he use to catch, and by experiencing, he can recognize clear species and mixt of species. Fish analyser helps to target more wanted species.



Biomass analysis comes from all swath detections.

- **2D & 3D biomass presentation**
- **Biomass GIS positioning**
- **Habitat Fish (acoustic strength) analyzer**
- **Shoal Fish (acoustic strength) analyzer**
- **Biomass layer analyzer**
- **Shoal habitat analysis**
- **Class of Fish Analyzer**





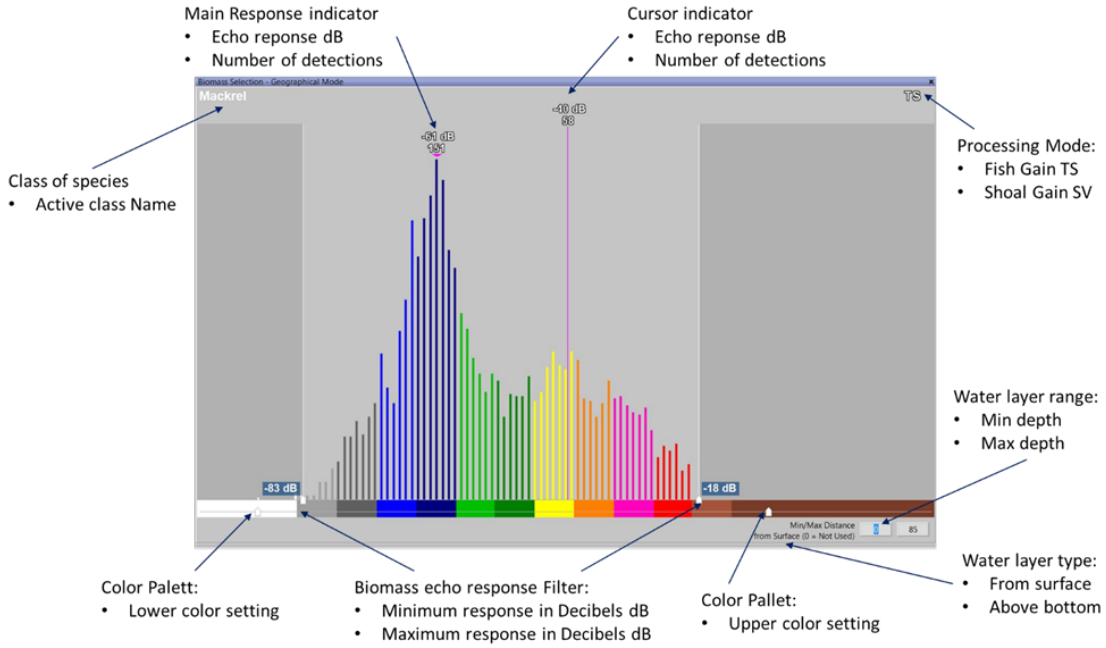
Those calibrated measurement in TS or SV modes (Fishery Research metrics) provide skipper with very reliable information about fish species acoustic responses. By experiencing, skipper learn about species specifications.

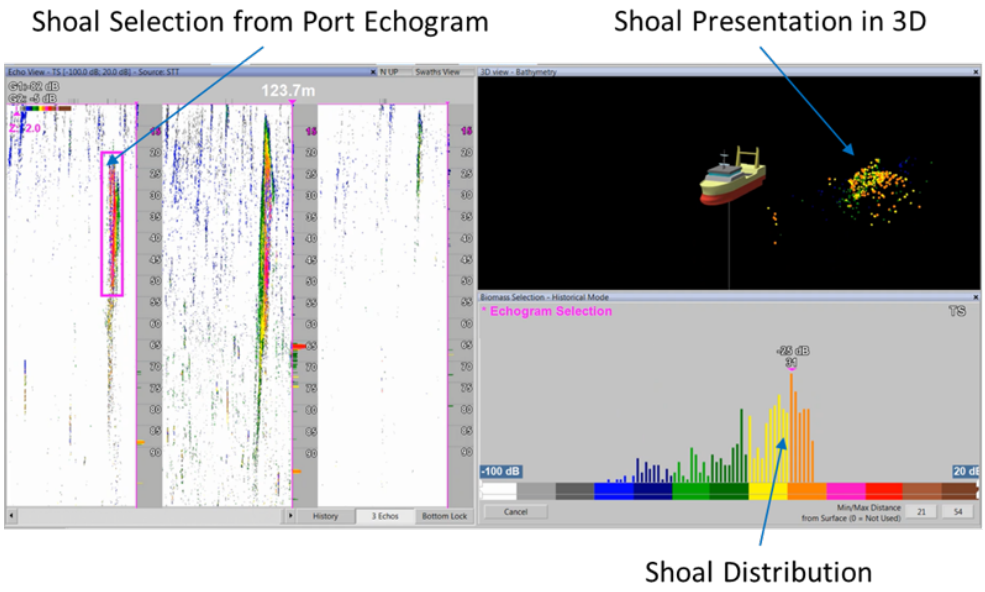
Biomass detection from single targets of 7 cm is extracted, according to skipper criteria filters: location, layer, TS or SV response.

IXBlue proposes an exclusive *GBA* "Geographical Biomass Analyzer" processing, allowing skipper to build its own « Fish Classes » with relevant settings. Each Class is defined by the Min/Max acoustic response filter accordingly to a water layer. GBA shows 2/3 D mapping of selected fish Classes and compute Ratio % of abundance of each one in the selected area.

GBA is the new "Geographical Biomass Analyzer" developed by IXBlue. This functionality is very new on commercial fisheries activities.
Every single acoustic detection of fish target is gathered its geographical position. Fish echoes come from all SeapiX swath in action, providing several thousand detections of fish on shoal or scattered fishes.

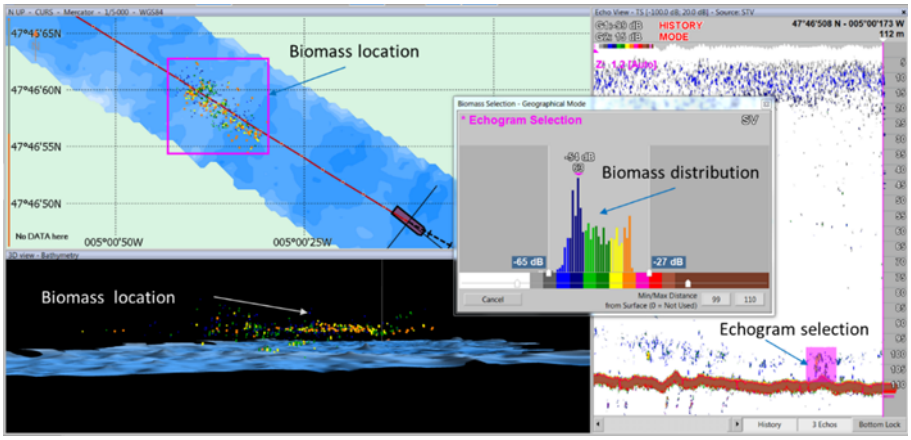
GBA is a statistical processing tool, able to compute fish echoes distribution from entire water volume.
These volumic distribution histogram calculation can be described according to several filtering criteria, as minimum & maximum acoustic response levels, as minimum and maximum depth of the studied water layer, and according to the Geographic selected area or according to the history of fish detections.





GBA functions gather a huge quantity of single fish detection and processes it in real-time.
When the operator selects a shoal, the histogram shows the spread in various acoustic responses about each fish category or species.
At a first stage, “Shape” of the histogram provides quick feeling to skipper to evaluate if one or several species are in the area. Pure “single species” shoal provides a narrow histogram distribution curve.
Mixt of several species or mixt of fish size provides a wider histogram distribution curve.

In single species cases, it is interesting to evaluate how the histogram curve is narrow or wide (relatively).
Even if the histogram provide on single “pick” providing probability of single species detection,



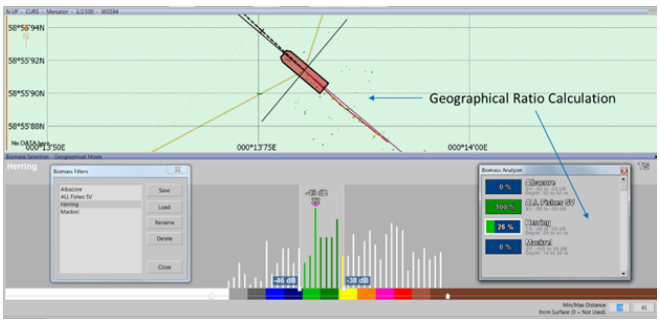
Acoustic Decibel sound echo response of fishes depends on type of species at a defined depth and depends on fish behaviour. Thanks to volumic coverage of SeapiX, high quantity of fish sampling ensure computation of realistic and accurate histogram distribution.

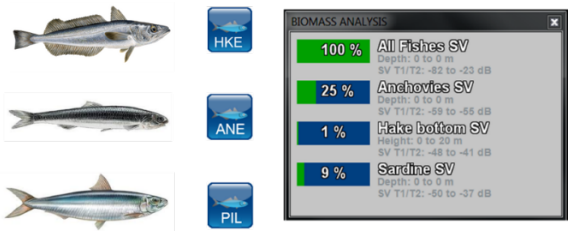
SeapiX provides both “Shoal SV” and “Fish TS” processing. High resolution of SeapiX allows to run Fish TS analysis, especially for scattered fish as Mackerel, Herring, sardine, tuna…
When fish is forming more aggregated shoal, it becomes more relevant to run “Shoal SV” processing.

Then skipper has to define his own “Class of Fish” by experiencing relationship between SeapiX detections values and real catches on deck.

Biomass Class discrimination

In order to provide easy to understand biomass discrimination indicators, SeapiX computes automatically Ratio distribution of biomass Classes. This ratio in % shows the observed relative % of each Class in biomass database.
Ration % computed by SeapiX is the percentage of each Class in the selected Ecosystem, according to the biomass selection (from the Echogram or from the 2D area frame) and the water layer selected.
This calculation is available for the three modes, Historical, Geographical and Echogram selection.

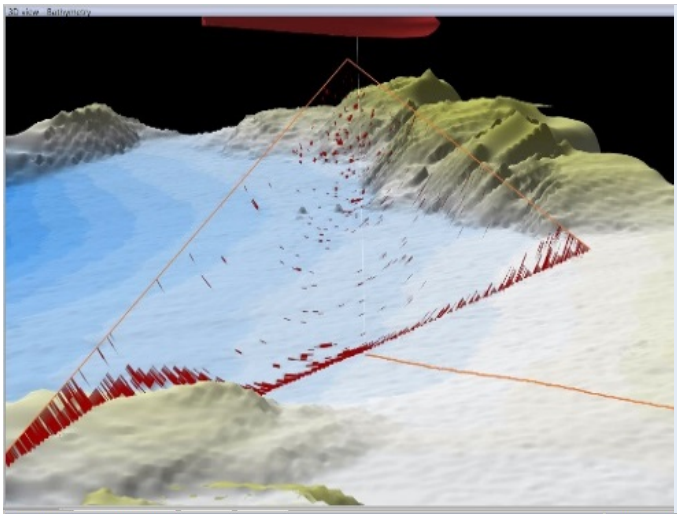




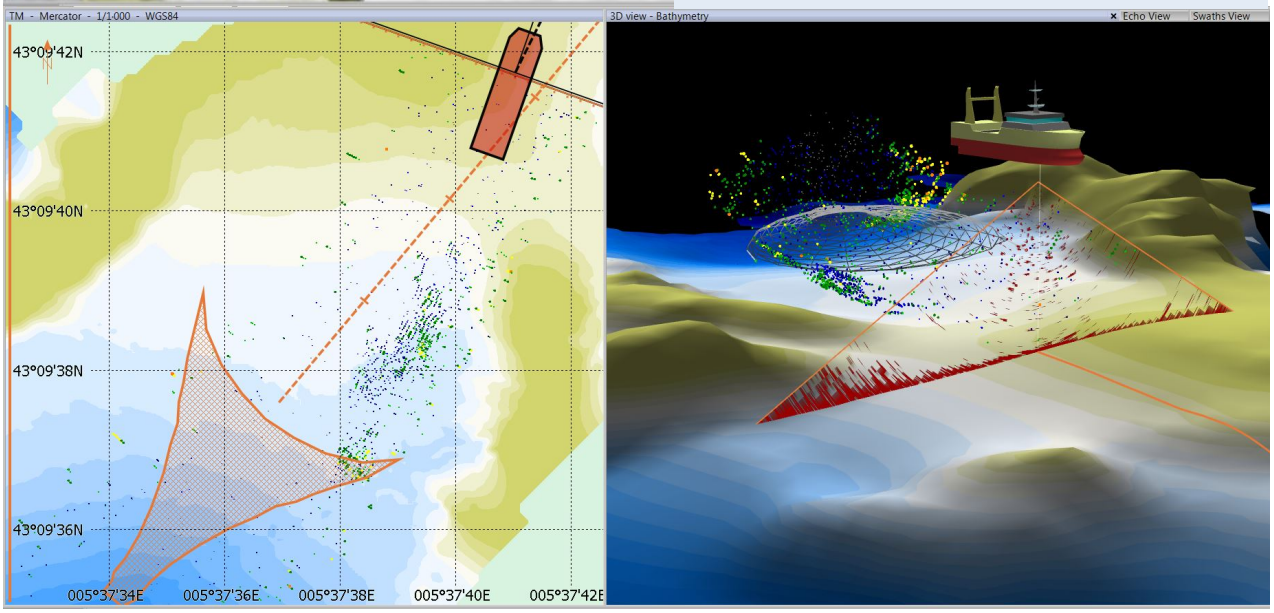
This unique Biomass discrimination tool allows genuine "Sustainable" fishery methods.

3D Ecosystem monitoring

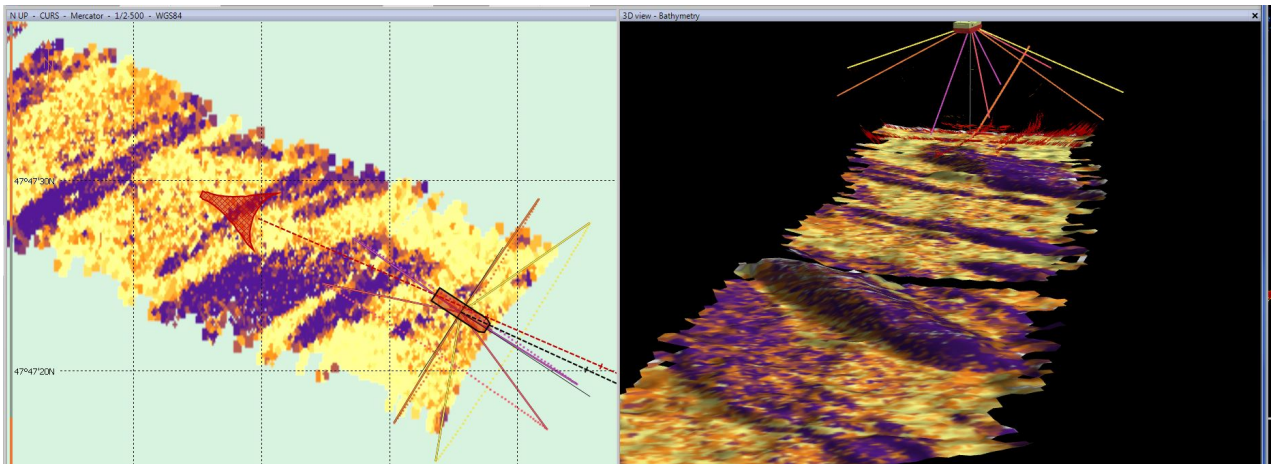
3D Mode consists of a whole synthetic fishing action picture. Net gear modelling and simultaneous shoal biomass representation offers the most advanced "Selectivity Monitoring" , by providing total and accurate control for searching, tracking, and catching stages. Navigation chart information and user database objects or layers are also superimposed.
3D view shows all acoustic data layers, biomass, Real time bathymetry, imported bathymetry, and user objects. It provides a genuine fishing operation awareness system. It allows selective net gear navigation strategies to reduce by catch.



- **Depth cursor & beam swath indicator**
- **Virtual camera related to 2D field of view indicator**
- **Virtual camera auto-tracking on Vessel/Trawl/point of interest**
- **Adjustable Bathy grid cell resolution**
- **Adjustable Z/X Bathy amplification**
- **Bathy color palette control, auto & customized**
- **User/event objects viewer**
- **Real time acoustic swath projection**
- **Real-time Bathy layers**
- **Real-time Biomass layer**
- **Imported bathymetry layer**
- **Chart and track Bathy layer**
- **Trawl gear module**



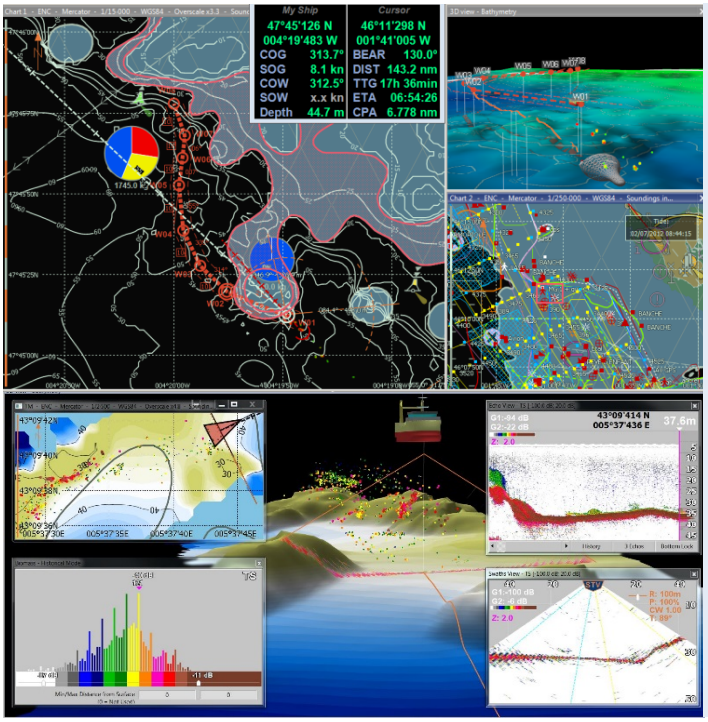
Bottom absolute “hardness” is processed together with bathymetry MNT profiles. Thanks to embedded motion compensation and special processing to enhance BS measurement by applying grazing angles, SeapiX provides unique features to understand changes in seabed materials.



2D: Advanced 2D fishing plotter

2D Mode consists of a state of the art professional Survey plotter. To make seabed and biomass information relevant, IXBlue makes the most of its 30 years' GIS experience by introducing its latest Gecdis technology into SEAPIX processing chain. This built-in state of the art ECS type Geographical Information System brings the full high end fishing plotter capabilities. Every acoustic data processed by SeapiX is instantaneously plotted and stored into the skipper's database for real-time or future analysis.

It affords the best security and navigation guarantee and also introduces the new standard ECS (Electronic Chart System) to the fishing industry, with an interactive anti-grounding tool, and respects yet IMO standards. According to skipper special needs, several additional modules can be added.
2D view shows all acoustic data layers, biomass, Real time bathymetry, imported bathymetry, bottom hardness and user objects.



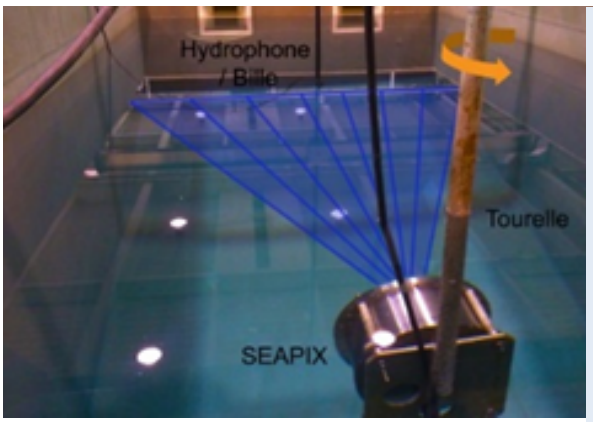
- **ENC/ CMAP NT/CMAPMAX charts**
- **Turbo, Maxsea, data importing tool**
- **Navigation tools, tide calculation**
- **Tracks, routes management,**
- **User object filtering and layers**
- **Multi-fleet management**
- **ARPA/AIS management**
- **User/event objects filtering**
- **Real-time Bathy layer**
- **Real-time Biomass layer**
- **Imported bathymetry layer**
- **Commercial Sediment layers (option)**
- **Chart and track Bathy layer**
- **Trawl gear module**

Fishery Research Version

SeapiX is available as a "Fishery" version (SeapiX-F), or as a "Research" version (SeapiX-R) for scientific purposes. SeapiX Research version (SeapiX-R) includes a specific transducer array delivering 212 dBA, and can operate Research software suite.

SeapiX research version allows to measure TS response in STV swath, and also 3D behavioural patterns of biomass in the entire Ecosystem with its SV calibrated response.
Thanks to versatility of SeapiX mounting configurations, volumic Vertical or Side Looking study of habitats provide both classic acoustic measurement and innovative aggregation study methods.

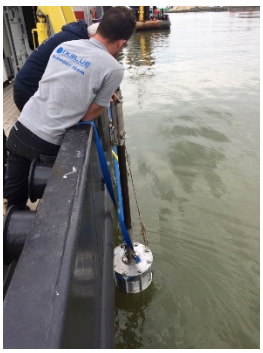
In addition, Side or Forward Looking near surface detection capabilities provides unique and more realistic assessment of biomass, with less vessel avoidance effect. Fish assessment is more realistic than standard research sounders.

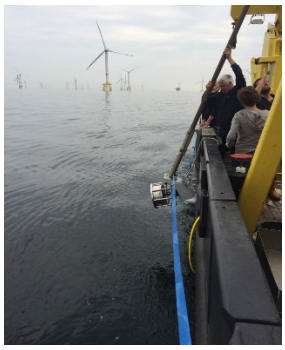


- **Research scientific array with 212 dBA**
- **Factory SV Calibration & certificate of STV swath at delivery,**
- **Factory TS Calibration & certificate of STV swath at delivery,** (available from June 2017)
- **In situ Calibration facility and monitoring,** (from June 2017)
- **STV swath Split Beam processing with TS,** (from June 2017)
- **HAC scientific protocol generation for STW swath,**
- **ECHOVIEW Interface for STV data post processing,**
- **RTK DGPS input,**

Additional feature of standard SeapiX:

- **Raw data recording and replaying,**
- **Bathymetry data stream in real time,**





INRA & VLIZ institute operations of SeapiX on pole mounting

3. Specifications

3.1. User functionalities

SeapiX base line									
Presentation	STV Acoustic swath	STT Acoustic swath	SAT Acoustic swath	SAV Acoustic swath	SLI Side Imaging	Sonar Omni	Echogram 1 or 3	2D mapping	3D mapping
Range	0-300m Auto	0-300m Auto	0-300m Auto	0-300m Auto	0-300m	0,1- 8 NM Manual	0-300m Auto/shift	0,1–5000 NM	0,1- 8 NM
Tilt	Fix 90°	+50°/90°/-50°	+50°/90°/-50°	Scan+50°/-50°	-	-	-	-	-
Display Gain	0 à 100%	0 à 100%	0 à 100%	0 à 100%	0 à 100%	0 à 100%	0 à 100%	-	-
Display Filter	0 à 100%	0 à 100%	0 à 100%	0 à 100%	0 à 100%	0 à 100%	0 à 100%	-	-
Colour palette	Adjustable	Adjustable	Adjustable	Adjustable	Adjustable	-	Adjustable	Adjustable	Adjustable
Modulation	FMH or CW	FMH or CW	FMH or CW	FMH or CW	FMH or CW	-	FMH or CW	-	-
Bathy layer	-	-	-	-	-	-	-	●	●
Isoline layer	-	-	-	-	-	-	-	●	●
Biomass layer	-	-	-	-	-	●	●	●	●
Geo-synchro Fish Distribution	-	-	-	-	-	●	-	●	●
Fish Class Analyzer	-	-	-	-	-	-	-	●	●
Mark creator	-	-	-	-	●	-	●	●	●
ERM/VRM	-	-	-	-	-	-	-	●	●
User objects	-	-	-	-	-	-	-	●	●
Chart depth &	-	-	-	-	-	-	-	●	●

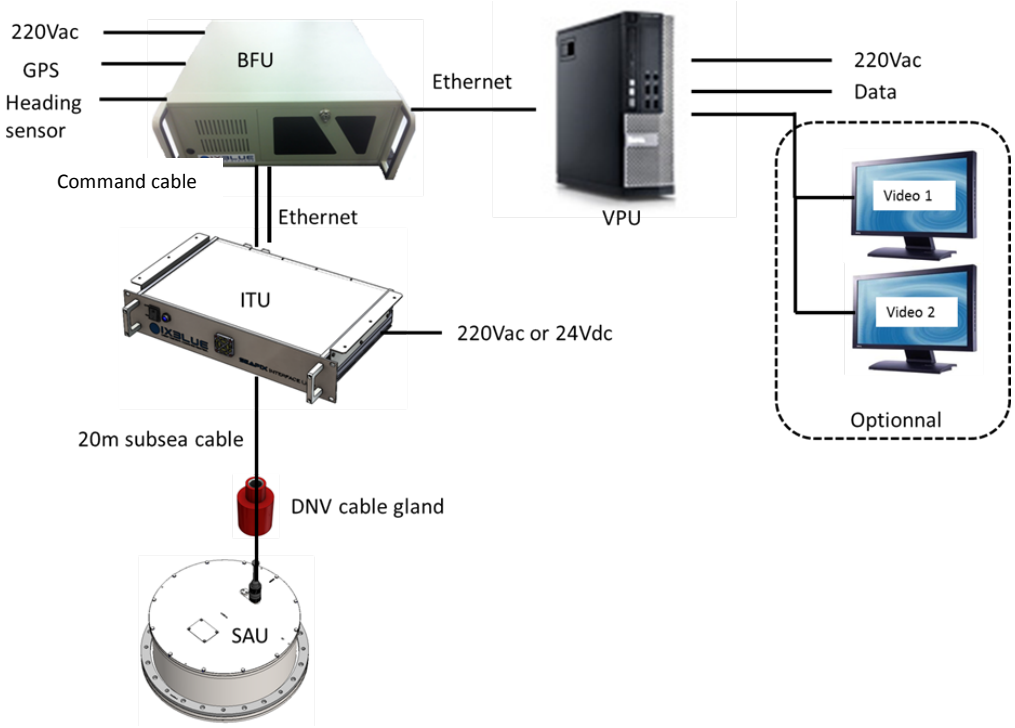
Tracks bathy layer									
Imported bathymetry	-	-	-	-	-	-	-	•	•
Trawl display	-	-	-	-	-	•	-	•	•
AIS-ARPA	-	-	-	-	-	-	-	•	-

3.2. Technical features

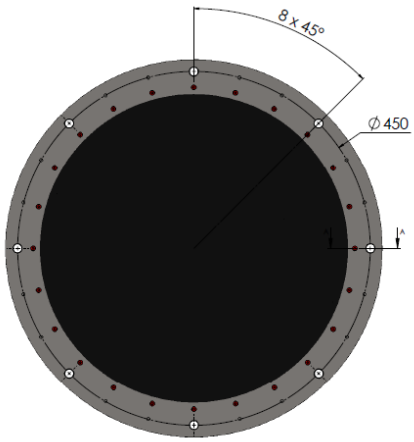
General features	Features	Conditions
Acoustic frequency for Tx and Rx	150 Khz	
Acoustic power	SeapiX F: 209 dBA / SeapiX R: 212 dBA	
STV, STT, SAT, SAV Swaths	Bottom Coverage =Twice depth value	5m to 100 m depth
Bathymetry vertical resolution on center beam with HR mode	+/- 4 cm	5m to 100 m depth
Bathymetry vertical resolution on center beam with LR mode	+/- 8 cm	10m to 200 m depth
Bathymetry MNT sampling by amplitude detection method	64 true points	
Beam resolution for bathymetry measurements	1,6° x 1,6°	
Minimum individual target size discrimination	7, 5 cm	High Band mode
Minimum inter-individual target size discrimination	15 cm	Low Bandmode
Embedded Roll/Pitch/Yaw/Heave motion sensor, to be processed together with external compass.	Pitch/Roll/heave compensation	
Minimum external data inputs requirements	Features	Conditions
Positionning NMEA sentences	GLL GGA PFEC	From 2400 to 115200 Bds 8/N/1
Heading NMEA sentences	HDT HDM	From 2400 to 115200 Bds 8/N/1
Position/Speed/Time sentences	RMC & ZDA	From 2400 to 115200 Bds 8/N/1
Speed over ground NMEA sentence	VTG	From 2400 to 115200 Bds 8/N/1
Optional requirements for external sensor data inputs	Features	Conditions
Trawl systems (Marport, , Simrad, Ixsea) interface	See Installation manual	From 2400 to 115200 Bds 8/N/1
AIS	VDM & VDO	From 2400 to 115200 Bds 8/N/1
ARPA	TTM & TLL	From 2400 to 115200 Bds 8/N/1
AUTOPILOT	APB, RMB, XTE, WCV, HSC	From 2400 to 115200 Bds 8/N/1
Miscellaneous NMEA protocols, see installation manual.	DTM,ZLZ, ZZU, DPT, DBT, DBS, DBK, VBW, VDR, OSD, VHW, MWD, MWV, VWR, VWT, MTA, MTW, MDA, MHU, MMB, MWH, MWS, ROT, RSA, VLW.	From 2400 to 115200 Bds 8/N/1
Data Output format	Features	Conditions
TCPIP Sodena Proprietary Stream for multi Station purpose	SPS Protocol, Option	
HAC Fishery research output protocol	Option	
Operating systems	Features	Conditions
BFU, Linux based operating system		
VPU, Windows based operating system	Seven Pro	
Operator SEAPIX languages	Uk, Fr, Ger, Dan Is, Ru, No, It, Sp, Gr, Jp, Ko	
Displays	Dual VGA Display output	
Database	Features	Conditions
Bathymetry/ Hardness Database, IXBlue proprietary format,	IX proprietary	
User objects, tracks, marks, routes under Sodena proprietary format, exportation tool included.	IX proprietary	
User objects, marks, routes import tool to recover Turbo plotters and Maxsea plotters data.		
X,Y,Z bathy files importation tool	Text file	
Running environnement conditions	Feature	Conditions
VPU processor unit	From 0°C to 50 ° C ambient temp	Humidity 85%max
BFU processor unit	From 0°C to 50 ° C ambient temp	Humidity 85%max
ITU Interface unit	From -15°C to 55 ° C ambient temp	Humidity 95%max
SAU antenna unit	-5° C to 35°C water temp	20 m depth rating max
Power supply requirements		
BFU	100-240 Vac @50-60hz	600 W
VPU	100-240 Vac @50-60hz	130 W
ITU	24 Vdc : 21.6-26.4 Vdc Or 240 Vac@50-60hz	I peak = 20A max, I moy = 7A max

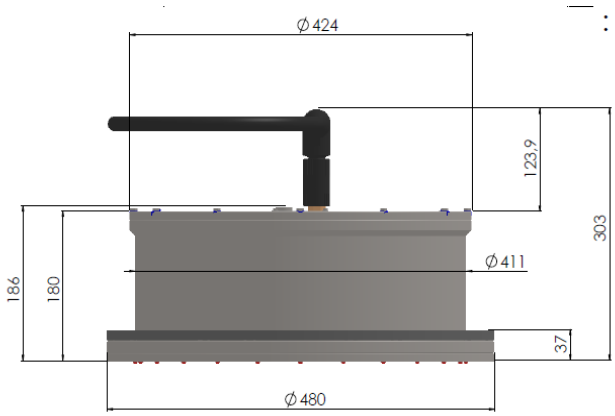
3.3. Technical features

SEAPIX diagram assembly



SEAPIX SAU Antenna Unit





4. Proposal N° QU_

4.1. SeapiX – F Fishery version,

Qty.	Designation	Price € ex VAT
	SEAPIX - F	TBA €
1	**SEAPIX Software:**	
	STV, STT, SAT, SAV, SLI, ECHO, 2D, 3D, modes.	
	2D + 3D bathymetry acquisition from SeapiX and third party NMEA sounder, X/Y/Z bathy import tool	
	ENC charts (without map data)	
	CMax and CMapNT (without map data)	
	Multi Mobile fleet management, AIS-ARPA, Trawl module	
	Advanced navigation tools, Tracks, Route, autopilot control	
	Tide calculation, Xtide bathy compensation, Proudman reader (excl. data)	
	Sediment hardness layer & hardness histogram and Proudman commercial sediment reader (date not included)	
	Biomass layer & Fish distribution histogram,	
	General object Filter + Group of object filter	
	Import Gecdis (User objects & bathy)	
	Import/Export SeaXpert (User object & bathy)	
	Import/Export TW (User objects & bathy)	
	USB HL protection dongle	

Qty.	Designation
	SeapiX Hardware:
1	SAU SEAPIX Antenna Unit, 206 dBA,
1	ITU Interface Unit
1	BFU Beam Former Unit processor
1	VPU Viewer Processor
1	20m SeapiX SAU-ITU cable with Seacon connector and DNV cable gland
1	30m ITU-BFU RJ45 Ethernet câble

Not included: External navigation data (Position/Speed/Heading) sensors.

4.2. SeapiX – R Research version,

Qty.	Designation	Price € ex VAT
	SEAPIX - R	TBA €
1	**SEAPIX Software:**	
	Upgradable with Research pack software suite,	
	STV, STT, SAT, SAV, SLI, ECHO, 2D, 3D, modes.	
	2D + 3D bathymetry acquisition from SeapiX and third party NMEA sounder, X/Y/Z bathy import tool	
	ENC charts (without map data)	

	CMax and CMapNT (without map data)
	Multi Mobile fleet management, AIS-ARPA, Trawl module
	Advanced navigation tools, Tracks, Route, autopilot control
	Tide calculation, Xtide bathy compensation, Proudman reader (excl. data)
	Sediment hardness layer & hardness histogram and Proudman commercial sediment reader (date not included)
	Biomass layer & Fish distribution histogram,
	General object Filter + Group of object filter
	Import Gecdis (User objects & bathy)
	Import/Export SeaXpert (User object & bathy)
	Import/Export TW (User objects & bathy)
	USB HL protection dongle

Qty.	Designation
	SeapiX Hardware:
1	SAU SEAPIX Antenna Unit, 212 dBA,
1	ITU Interface Unit
1	BFU Beam Former Unit processor
1	VPU Viewer Processor
1	20m SeapiX SAU-ITU cable with Seacon connector and DNV cable gland
1	30m ITU-BFU RJ45 Ethernet câble

Not included: External navigation data (Position/Speed/Heading) sensors.

4.2.1. Research Pack for SeapiX-R

Qty.	Designation	Price € ex VAT
1	**Research pack, including:**	TBA €
	Factory SV Calibration & certificate of STV swath at delivery,	
	Factory TS Calibration & certificate of STV swath at delivery, *(available from June 2017)*	
	In situ Calibration facility and monitoring, *(from June 2017)*	
	STV swath Split Beam processing with TS, *(from June 2017)*	
	RAW data recording and replaying	
	HAC scientific output utility for third party post processing	
	Interface to ECHOVIEW for STV data post processing	
	Bathy real time output stream	
	XYZ bathy data Import/ Export	

Calibration sphere not included.

4.3. Installation, commissioning & Training Service for SeapiX

Qty.	Designation	Price € ex VAT
1	Training course at sea, 2 days. Travelling expenses not included. Extra days will be charged. Travel & accommodation costs are at customer expenses (When paid in advance by IXBlue, 15% rate is applied on expenses).	TBA €
2	Engineer On-site (Extra days after training) Guideline: Installation Assistance – 2 days, Commissioning – 3 days	TBA € Per day/Per

		engineer

4.4. Logistic Option for SeapiX

Qty.	Designation	Price € ex VAT
	Optional shipments of SeapiX	TBC
	Shipment from factory IXBLUE La Ciotat, FCA. IXBlue will quote the transport as an extra option, or the customer manages the transportation of the good from the factory at its expenses.	To be quoted Not included

4.5. Summarize of the proposal

The commercial proposal above includes:	Euros ex VAT
• One SeapiX –F system (Commercial Fishery)	TBA €
• Training at sea (2 days)	TBA €
• Engineer on site (5 days)	TBA €

It does not include:

- Non specific cables,
- External navigation data (Position/Speed/Heading) sensors,
- UPS to supply ITU/BFU/VPU, 24' displays
- Transportation expenses, IXBlue engineer travelling expenses,
- Vessel modification for installation, dry docking , diver fares,

TOTAL € ex VAT	**TBA €**

5. Terms and conditions for quotation

The standard IXBlue terms and conditions are applied. In addition the following dedicated quotation terms have to be applied.

5.1. Offer validity:

The quotation is valid until 1st April 2018.

5.2. Price:

All prices quoted are in Retail Euro € excluding VAT, freight, insurance, import taxes, custom fees or other duties, Ex-works La Ciotat FRANCE premises. Display units and external navigation data (Position/Speed/Heading) sensors are not included. Any hull arrangement, vessel modifications or dry-docking, mechanical and electrical arrangement to fit the system are not included. Travel & accommodation expenses are not included. Waiting time for IXBlue engineer will be charged to the customer (800 € /j).

5.3. Delivery time:

Standard delivery time is 10 weeks from order confirmation. Delivery time could be shorter, on request. Order is confirmed by former Purchase Order and down payment sent to IXBlue.

5.4. Shipment:

Shipment from factory IXBLUE La Ciotat, FCA, is not included, at customer expenses.

5.5. Payment terms:

Payment terms are:

Terms	**Payment**
Order confirmation	Payment of 30% of the project AT order confirmation,
Delivery of SeapiX	Payment of 70% not later than 30 days after delivery date,

All Payments are due to be paid by swift.

5.7. Warranty:

IXBlue warrants only SEAPIX units installed by authorized dealer, and having received hull mounting project approval form from IXBlue. RMA procedure has to be opened prior to any return of goods to IXBlue. IXBlue applies 2 years warranty from delivery date, including parts and labor expenses by goods return at IXBlue premises. IXBlue product is guaranteed to be free from defect in material and workmanship over the warranty period, from date of shipment. During the warranty period, IXBlue will repair or replace, at its own option, the defective parts if any. Defective products shall be returned to IXBlue under owner's responsibility and expenses. IXBlue charges the repaired goods shipment back to the customer.

6. General Terms and conditions

Article 1 – Approval of the General Terms and Conditions of Sale
The present General Terms and Conditions of Sale, together with the Particular Conditions, set out the conditions by which IXBlue sells its goods to the buyer.
The application of professional practices is expressly excluded when the said professional practices do not conform to the present General Terms and Conditions of Sale and possible Particular Conditions. Except for the parties to the sale to commonly decide differently, the terms and conditions that figure in the general purchasing conditions, order forms or other documents coming from the buyer are not applicable to IXBlue.

Article 2 – Intellectual property rights
2.1. The Purchaser undertakes, both personally and on behalf of any person under the Purchaser's authority (including the Purchaser's staff, partners, joint contractors, subcontractors, etc), to take all measures deemed necessary, as required to comply with the intellectual property rights (patents, drawings, designs, etc) of IXBlue or of any other person involved in the manufacturing of the goods, and to have such rights complied with, and to keep as secret all the technical documents, studies, information and know-how associated with patents, drawings, designs, etc, as will be communicated to the Purchaser by IXBlue and to which the Purchaser or any other person may have access in order to be able to use the goods sold.
2.2. All studies, schemes, drawings and other documents provided or sent by IXBlue shall remain the property of IXBlue and they may not be disclosed to any third parties by the Purchaser for any reason whatsoever without the prior written authorization of IXBlue.

Article 3 – Writing up the sales contract
3.1. Orders received from the Purchaser will only be deemed accepted definitively once confirmed in writing by IXBlue. Such acceptance shall be the sole instrument valid to determine the Special Terms of the order, if any.
3.2. Whenever a quotation is established by IXBlue at the Purchaser's request, the commitment of IXBlue, as well as Particular Conditions that would modify or supplement these General Terms of Sale may only be deemed valid once the order has been confirmed by IXBlue.
3.3. Except as otherwise stated, the terms set out in the quotations issued by IXBlue shall be valid for a period of ninety (90) calendar days, starting from the date they are established.

Article 4 – Delivery – Transportation of the goods
4.1. Conditions

The Purchaser notifies IXBlue about the required transportation mode. The deliveries are Ex-Works factory La Ciotat according to INCOTERMS 2010. Shipment expenses and other freight will be charged to customer.

Unless otherwise specified, the goods shall be deemed delivered to the Purchaser at the IXBlue plants or stores upon the third working day following the notification of availability to the Purchaser, or if prior to this, upon remittal to the Purchaser, a forwarder or a carrier designated by the Purchaser to IXBlue. The Purchaser shall take delivery of the goods within fifteen (15) calendar days of the notification of availability. Upon expiration of this time period, the Purchaser will be subject to penalties calculated according to article 8.3 below without affecting IXBlue's right to cancel the contract following the Purchaser's fault, to cancel unilaterally any orders currently being processed and to claim damages.

4.2. Delivery time
Deliveries shall be made according to the availability of goods, and in the order of reception of the orders. The planned lead times shall be stated in IXBlue's acceptance of the order and may be, upon Seller's sole decision, related to (calculated from) the full payment of any due account. Delays with respect to the lead times shall not give rise to any damages, countercharge, or cancellation of orders whether confirmed or in process. The Seller may make partial or total deliveries.

4.3. Transportation costs and risks
Unless otherwise specified, the Purchaser shall bear all costs and risks associated with the transportation of the goods sold, and any other expenses incurred, if any.

Article 5 – Export and import licenses for the goods
Whenever an export, import or transfer license is required for the goods that are ordered, IXBlue is committed to deliver the said goods and bound to any Particular Conditions for the order only once all the licenses required have been received. In case of export control from France, the Purchaser is bound to conform to any declarations on his behalf relative to the final utilization of the sold goods or to the commitment to non re-exportation without prior authorization, as with all applicable national regulations.

Article 6 – Authorization to re-sell the goods
The Purchaser utilizes the goods sold in the Purchaser's normal course of business. Up until full discharge of the sold goods from the property reserve in accordance with article 9 below, the Purchaser shall not re-sell the goods delivered, nor pledge the goods delivered or use them as security, or transfer the title thereto, even as a guarantee. Notwithstanding the preceding points, the buyer may not re-sell the sold goods if this is counter to commitments undertaken within the framework of the sale concerning export from France.

Article 7 – Authorization to transform the goods

The Purchaser is not authorized, in the Purchaser's normal course of business, to transform the goods.

Article 8 – Price of the goods

8.1. Pricing

All prices stated are prices before tax and are based on IXBlue tariffs in euros, as communicated to the Purchaser. The goods are invoiced at the current prices depending on the quantity of goods as mentioned in the confirmation of the order. Any taxes, charges or duties payable under French law or under any foreign law (import or transit country, etc) shall be borne by the Purchaser. Unless otherwise specified, the packaging, transportation, insurance and other costs shall always be borne by the Purchaser.

8.2. Terms of payment

Except as otherwise or specifically stated in the Particular Conditions for the order, the price shall be paid by the Purchaser:

- with an account, the sum total of which is specified in the Particular Conditions for the order, to be settled on reception of the order confirmation by IXBlue, the amount leftover being paid when the goods are delivered according to the terms below,
- when the goods are delivered:
    - to the Purchaser and payable cash; or
    - remitted to the forwarder or the carrier, and payable by bank transfer on the date and according to the bank details mentioned in IXBlue's confirmation of the order.

8.3. Sanctions and penalties applicable in case of non-payment or late payment

In case of late payment or non-payment on any agreed maturity dates, the day after the stipulated payment, the application of late payment penalties, without prior notice, calculated according to the whole of the sums payable, equal to three times the legal interest rate in force in France on the date of default of payment or late payment. In case of late or non-payment on the due date, IXBlue has the right to cancel the sale by rights without prior notice and without altering any other right or action in resolution and/or damages. In case of non-payment when due, the sale will be terminated by rights upon Seller's decision without prior formal demand, and the Seller may also ask in emergency proceedings that the goods be returned, without prejudice to any other claims for damages. IXBlue may also decide to cancel by rights and without prior notice confirmed orders in process and any prior orders, whether already delivered or in the delivery process, and for which payment is due.

Article 9 – Retention of title to the goods

The Seller shall keep title to the goods sold until the price has been paid in full, including the principal, and any applicable interests and penalties. For the purpose of this clause, the remittal of an instrument giving rise to an obligation to pay (bill of exchange, or any other mode of payment) shall not be held as effective payment until full collection of the sum involved. Any failure to pay any sums payable by a due date shall entitle the Seller to claim for the goods. In case of a seizure, or in case of intervention of a third party, before full payment of the price indicated,

the Purchaser shall notify IXBlue immediately and shall inform the said third party of the retention of title by IXBlue. The above provisions shall not preclude the transfer to the Purchaser, upon delivery, of the risks of loss and damage to the goods sold, and the risks of damage that the goods may cause.

Article 10– Return of the goods

Without prejudice to any claims against the forwarder or carrier, all claims for apparent defects on, or non-conformity of the goods delivered shall be notified not later than thirty (30) calendar days after delivery. The Purchaser shall provide IXBlue with all evidence in proof of the anomalies detected. The Purchaser shall fully allow IXBlue to remedy such anomalies and shall refrain from intervening himself or having any third party intervene for that matter. Any return of goods shall be agreed upon in a written agreement between IXBlue and the Purchaser, and all costs and risks associated with the return of the goods shall be borne by the Purchaser. Should any apparent defect or non-conformity be observed on the goods delivered and duly ascertained by IXBlue, the Purchaser may request to have the goods replaced at no extra cost, or reimbursed, without any other indemnification.

Article 11 – IXBlue's contractual warranty

11.1. Terms of the contractual warranty

The goods sold are guaranteed against any such operating defects as may result from defective material, workmanship, design or assembly, as set out below. The operating defect must be detected during the period of twelve (12) months following delivery, and during normal use and for the intended purpose of the goods. Warranty is excluded in the following cases:

- if the installation of the prescribed goods stipulated, if necessary, by the Particular Conditions, is not carried out by IXBlue or by a distributor with prior agreement with IXBlue;
- if the training for the use of the prescribed goods stipulated, if necessary, by the Particular Conditions is not carried out by IXBlue or by a distributor with prior agreement with IXBlue;
- if the component utilized, or the defective design of the goods is attributable to specific requirements of the Purchaser without endorsement by IXBlue;
- if the operating defect is caused by an intervention on the product or as a result of a transformation that was performed without IXBlue's prior approval;
- if the operating defect was caused by abnormal use and/or use without complying with the intended function of the goods;
- if the failure was caused by normal deterioration of the product, or by negligence or by improper maintenance on the part of the Purchaser;
- if the failure was caused by force majeure.

11.2. Enforcement of the contractual warranty

As part of the warranty, IXBlue shall decide whether to repair or replace the goods and/or any parts recognized as defective by his own technical experts, at no extra costs. This warranty shall cover the labor costs of the following operations: disassembly, reassembly, at IXBlue's plant. The replacement of parts shall not cause the warranty period mentioned in article 11.1 above to be extended.

11.3. Limitation of the contractual warranty

It is expressly agreed between the parties that IXBlue's liability in case of an operating defect on the goods shall be limited to the above provisions, and in case of damage, to the right of payment of an indemnity in an amount equal to the price of the goods.

Article 12– Automatic cancellation
Should the Purchaser fail to fulfill one of his obligations, the contract may be cancelled by rights, at IXBlue's request, without prejudice to any damages that may be claimed against the Purchaser in default. Except for the special provisions of article 8.3 above, cancellation shall take effect automatically fifteen (15) days after a formal notice has been sent and has remained without effect.

Article 13 – Cancellation of a clause
Should any provisions of these General Terms and Conditions of Sale be cancelled or made void, such cancellation or void shall not affect the other provisions herein or the validity of the General Terms and Conditions of Sale as a whole.

Article 14 – Settlement of disputes
The sales contract and the present General Terms and Conditions of Sale are written according to French law, excluding, when appropriate, the 11 April 1980 United Nations convention on international sales of goods. Any dispute arising in connection with a sale and that cannot be settled by amicable agreement within one month from notification of the difference by the more punctilious party, shall be finally settled by the commercial court having sole jurisdiction in IXBlue's registered office.

September 25th 2013

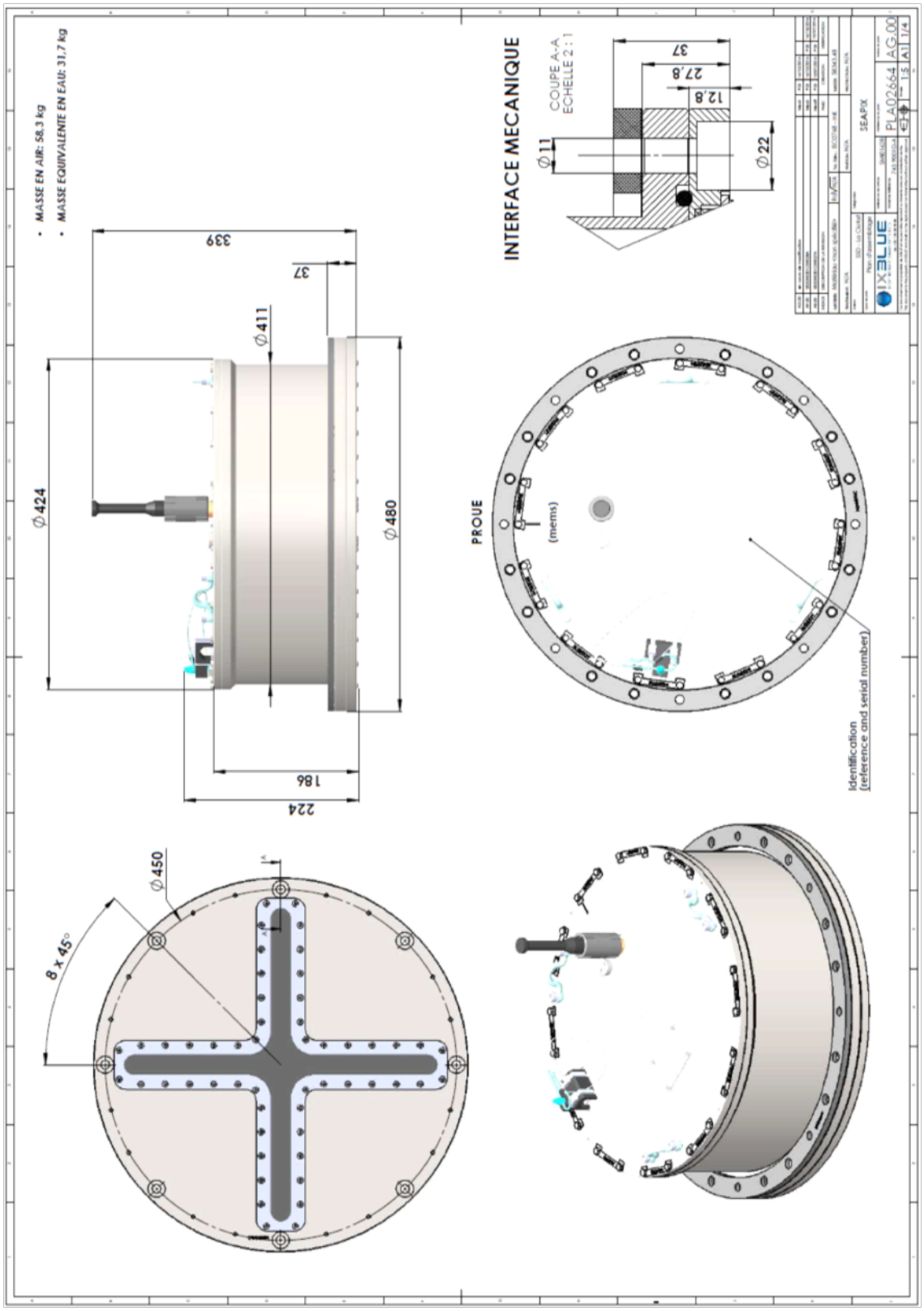
7. Appendix

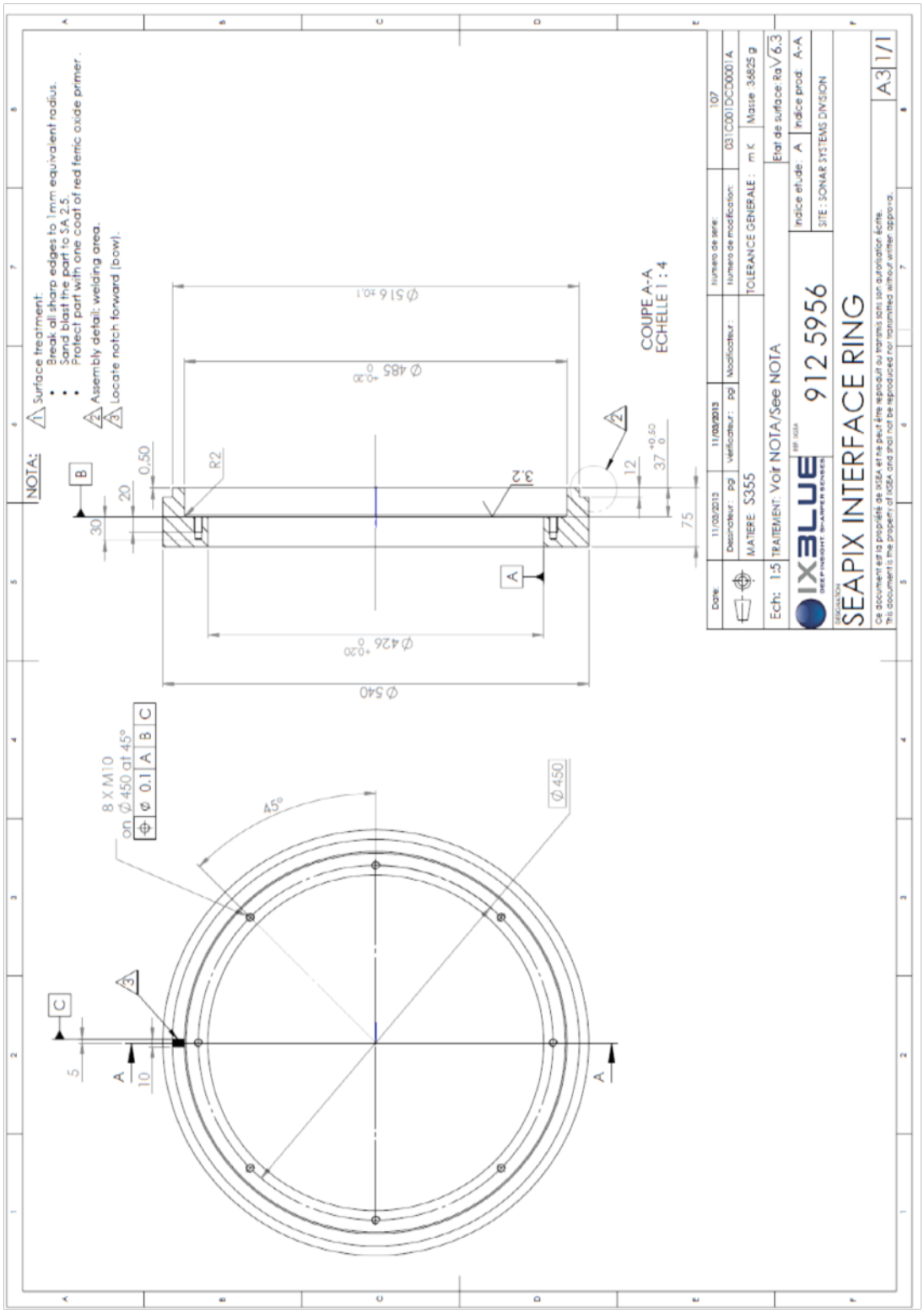
7.1. BFU/VPU Dimension

BFU:
Dimension: 482(W) x 450(D) x 177(H) mm: 19’’(W) x 17.7’’(D) x 7’’(H)
Weight: 15kg (33.1 lb)

VPU:
Dimension: 93(W) x 123(D) x 114(H) mm: 3.7’’(W) x 12.3’’(D) x 29’’(H)
Weight: 6kg (13.2 lb)

7.2. Mechanical interface


INTERFACE MECANIQUE
COUPE A-A
ECHELLE 2 : 1
37
27,8
12,8
Ø11
Ø22
• MASSE EN AIR: 58.3 kg
• MASSE EQUIVALENTE EN EAU: 31.7 kg
339
37
Ø411
Ø424
Ø480
186
224
PROUE
(mems)
Identification
(reference and serial number)
Ø450
8 x 45°
SEAPIX
PLA02664
AG.00
1/4


NOTA:
1 Surface treatment:
Break all sharp edges to 1 mm equivalent radius.
Sand blast the part to SA 2.5.
Protect part with one coat of red ferric oxide primer.
2 Assembly detail: welding area.
3 Locate notch forward (bow).
COUPE A-A
ECHELLE 1 : 4
Ø516 ±0.1
Ø485 +0.30 0
Ø426 +0.20 0
Ø540
R2
3.2
0.50
20
30
12
37 +0.50 0
75
8 X M10
on Ø450 at 45°
⌖ ø 0.1 A B C
45°
Ø450
5
10
Date 11/03/2013
Dessinateur : pg
Vérificateur : pg
Modificateur :
Numéro de série :
Numéro de modification : 03 IC001DC0000 / A
107
MATIERE : S355
TOLERANCE GENERALE : m K
Masse : 34825 g
Ech : 1:5
TRAITEMENT : Voir NOTA/See NOTA
Etat de surface : Ra √6.3
IXBLUE
912 5956
Indice etude : A
Indice prod : A-A
SITE : SONAR SYSTEMS DIVISION
SEAPIX INTERFACE RING
A3 1/1
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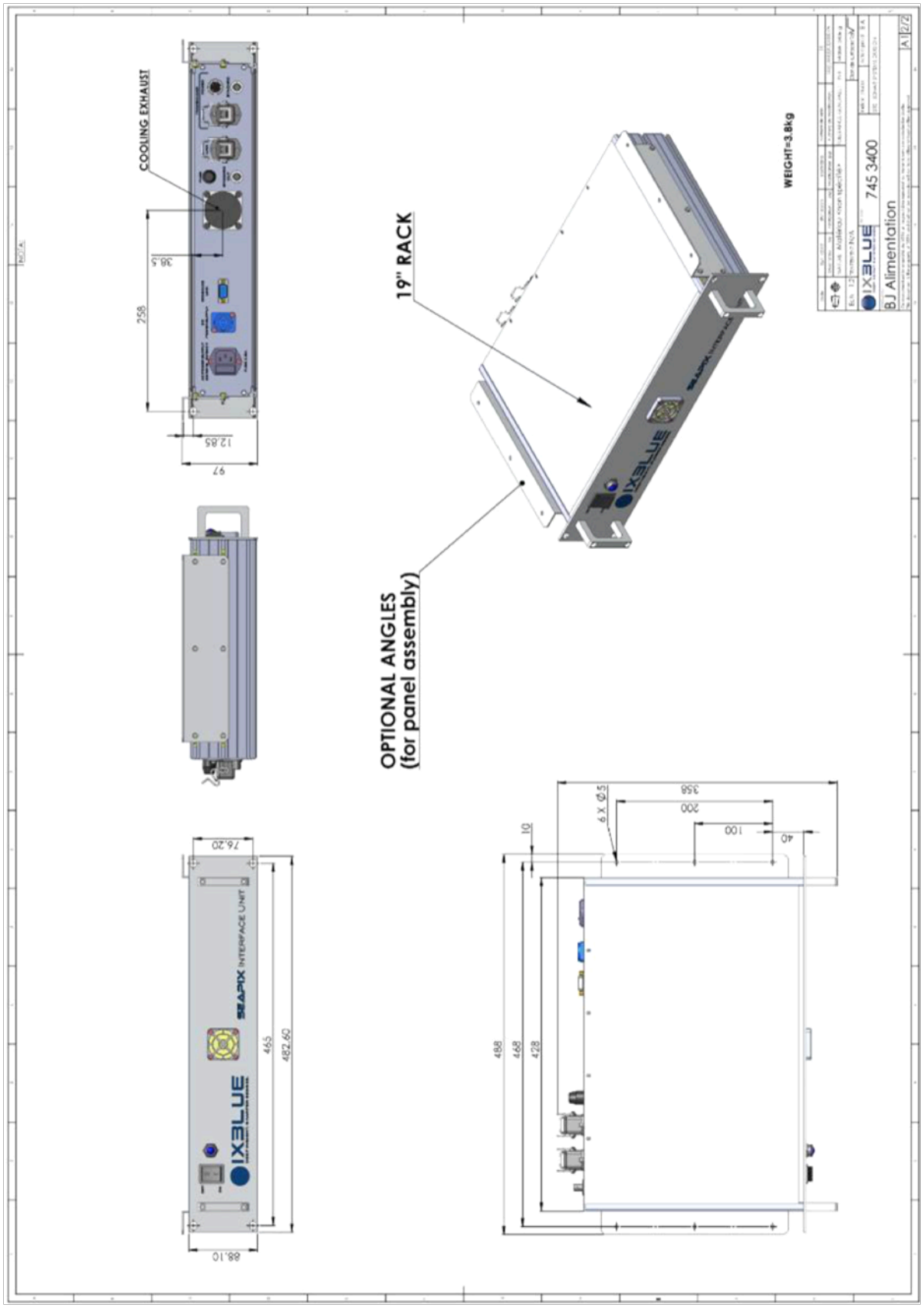
COOLING EXHAUST
19" RACK
OPTIONAL ANGLES
(for panel assembly)
WEIGHT=3.8kg
IXBLUE 745 3400
BJ Alimentation
SEAPIX INTERFACE UNIT
IXBLUE